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(54) IMPROVED WINDSCREEN WASHING SYSTEM

(71) We, ASSOCIATED ENGINEERING LIMITED, a British Company of 60, Kenilworth Road, Leamington Spa, Warwickshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

The present invention relates to a windscreen washer system for a vehicle.

Difficulty is often encountered in removing persistent marks, such as oil smuts or organic material, with windscreen washer systems using cold water and the present invention is concerned with a windscreen washer system for facilitating the removal of such persistent marks.

From one aspect, the invention consists in a windscreen washer system for a vehicle, comprising a heat-insulated reservoir for screenwash liquid, a heat-exchange device associated with said reservoir and being arranged for connection to the engine cooling system of a vehicle, whereby screenwash liquid in said reservoir can be heated by heat derived from the engine coolant when the engine is operated and the heated screenwash liquid stored in said reservoir, and means to supply said heated screen-wash liquid to the vehicle windscreen.

The heat exchanger device may be arranged to be connected in the top radiator hose of the engine cooling system or for location in a conduit of the engine cooling system in heat exchange contact with the screenwash liquid in the reservoir.

The reservoir itself may be made from a heat insulating material or the reservoir may be lagged or otherwise insulated to retain heat.

From a further aspect, the invention consists in a windscreen washer system for a vehicle having an engine cooling system including liquid coolant, said system comprising a reservoir for screenwash liquid, which reservoir is thermally insulating, means to supply said screenwash liquid to the vehicle windscreen, a heat-exchange device located to be in heat-exchange contact with said screenwash liquid and being arranged for connection to said engine cooling system to receive, when the engine is operated, liquid coolant at a temperature above ambient temperature whereby screenwash liquid in said reservoir can be heated and the heated screenwash liquid stored therein, and a thermostat device responsive to the temperature of said screenwash liquid, and connected to control heat transfer to the screenwash liquid from said heat-exchange device and thereby prevent boiling of said screenwash liquid.

In a preferred embodiment of the invention, the thermostat device is connected to reduce or interrupt flow of coolant through the heat exchange device when a predetermined maximum temperature is exceeded and is located within said reservoir, to be responsive to the temperature of screenwash liquid in said reservoir.

In another embodiment of the invention, a second reservoir is connected to feed the said reservoir with liquid when liquid is withdrawn therefrom for screen washing.

The means for feeding heated liquid to the vehicle windscreen may include a pump which may be manually or electrically operated. Where a heat exchange device and a manually-operated pump are used however the first reservoir should be so positioned to allow thermal siphoning as occurs for example in a domestic hot water system.

One or more dispensers may be provided for introducing controlled amounts of additives, such as anti-freeze or detergent, into the system. The additive dispensers may be situated either upstream or downstream of the reservoir or when there are two reservoirs may be situated therebetween.

The invention also consists in a vehicle including any of the windscreen washer system defined hereinabove.

The invention will now be further described by way of example with reference to the accompanying drawings in which:—

Figures 1 to 3 and 5 are diagrammatic

the pump circuit to the heat exchange device 36 via the pipe 34.

The quantities of additive dispensed by the dispensers 16 and 30 of Figure 1, dispenser 30 of Figure 2 and dispenser 50 of Figure 3 can be adjusted in dependence upon vehicle operating conditions. For example in the summer months the dispensers 16 and 50 would not be charged with anti-freeze and in the winter months the quantity of anti-freeze dispensed can be increased during periods of extreme cold. Moreover, instead of collecting water from a surface of the vehicle, water may be added direct to the cold water reservoir 10.

As a still further alternative, the thermostats may be replaced by an alternative regulating device such as a thermistor control circuit.

One advantage of the systems of Figures 1 to 3 is that the two reservoirs prevent the temperature of the incoming water from affecting the water in the hot water reservoir.

The embodiment of Figure 5 differs from those of Figs. 1 to 3 primarily in that the reservoir 10 is omitted and the heat exchange device is disposed within the reservoir 12 there being no need for a solenoid valve 28 and pump circuit such as is described in Figures 1 to 4.

Referring now to Figure 5, the hot water reservoir 12 is provided with a screw filler cap 13, or the like. A conduit 24 leads from the hot water reservoir 12, via a suitable pump 23 which may be electrically operated, to the screen-washer jets. Within the reservoir 12 there is provided a heat exchange device constituted by a metal coil 27, e.g. of copper, in parallel with a heater 29 of a vehicle. The coil 27 is immersed in the screenwash liquid when the reservoir is full. When the screenwash liquid is cold hot engine coolant flows from the engine via a conduit 33 through the coil 27 and back to the engine via conduit 35 as well as through the vehicle heater 29. The conduits 33 and 35 are connected by suitable fittings to the heater conduits 37 and 39 leading from and back to the engine respectively. Within the reservoir 12 is located a thermostat valve 31 which is positioned in the coil 27 near the lowest point of the reservoir 12. The thermostat device is responsive to the temperature of the screenwash liquid in the reservoir, and is set to control heat transfer from the coil 27 by reducing or interrupting the flow of engine coolant through the coil 27 — the latter causing the full flow to pass through the heater 29 — when the temperature of the screenwash liquid in the reservoir 12 reaches, say, 80°C thereby to prevent boiling of the screenwash liquid. The thermostat 31 will have a suitable hysteresis so that it opens again when the screenwash liquid temperature has fallen by, say, 10°C.

The inlet to conduit 24, which is near the bottom of the reservoir 12, is preferably fitted with a filter 40.

Additive dispensers such as 16, 30, 50 and their associated metering devices may be connected in the system of Figure 5 if so desired.

Alternatively or in addition, to direct filling of the reservoir 12 with screenwash liquid, water may be collected, as by the collector 11 of Figs. 1 and 3, from a surface of the vehicle and led into the reservoir by a suitable pipe which would pass through an aperture in suitable closure means or in the cap 13. As an alternative, the vehicle radiator may replace the heater 29.

Referring to Figures 6 and 7 the liquid supplied to the windscreen 41 of a vehicle 43 along conduit 24 of any of Figures 1 to 3 and 5 can be fed as shown in Figure 6 from jets 45 mounted under the screen or alternatively as shown in Figure 7 from a pipe 47 attached to each wiper arm 49 of the windscreen wipers of which only one windscreen wiper 51 is shown. With the jets 45 mounted below the screen 41 however, the water jet must be swept by the wiper arms 49 from the position where it strikes the screen to clean the area wiped by the wiper blade 52. When the water is supplied from the pipe 47 attached to the wiper arms 49 it is fed from one side of the blade 52. In this way the water is not wiped away when the arm is moving in the direction in which the blade precedes the water. It is preferable therefore to pump water only when the water precedes the blade. This can be done by means of a commutator switch on the wiper motor spindle which is arranged in series with the pump supply.

It may be advantageous as shown in Figure 8 to fix a sponge 53 alongside the or each wiper 51, through which water may be fed to the screen. Hence a double wiping action is provided when the sponge precedes the wiper. A mechanism (not shown) may be used to raise the sponge 52 on the return stroke of the wiper. The mechanism may take the form of a cam, operatively connected to the motor spindle and arranged to displace a Bowden cable at selected positions. The sheath at the other end of the Bowden cable may be attached by a bracket to a wiper arm 49 and the free end of the cable connected to a clamp which carries the sponge 52. Hence during a return stroke, the sponge is lifted from the windscreen 41.

Alternatively a solenoid-operated valve may be provided on the or each wiper, the solenoid being actuated, deactuated by a pair of limit switches positioned adjacent each end of the wiper stroke. The limit switches are used to operate a latching relay

ence to Figures 3 and 4 and any one of Figures 6 to 8 of the accompanying drawings.

17. A windscreen washer system substantially as hereinbefore described with reference to Figure 5 of the accompanying drawings.

18. A windscreen washer system substantially as hereinbefore described with reference to Figure 5 and any one of Figures 6 to 8 of the accompanying drawings.

19. A vehicle including a windscreen washer system as claimed in any preceding claim.

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1451666 COMPLETE SPECIFICATION

5 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

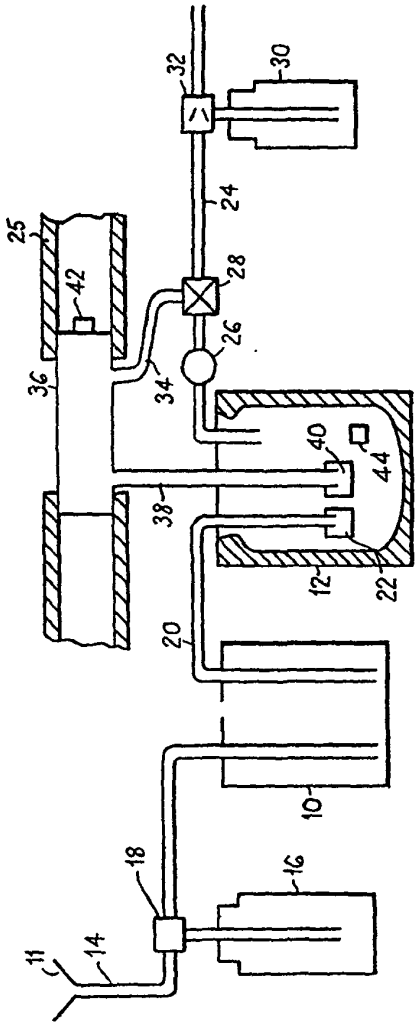

Fig.1

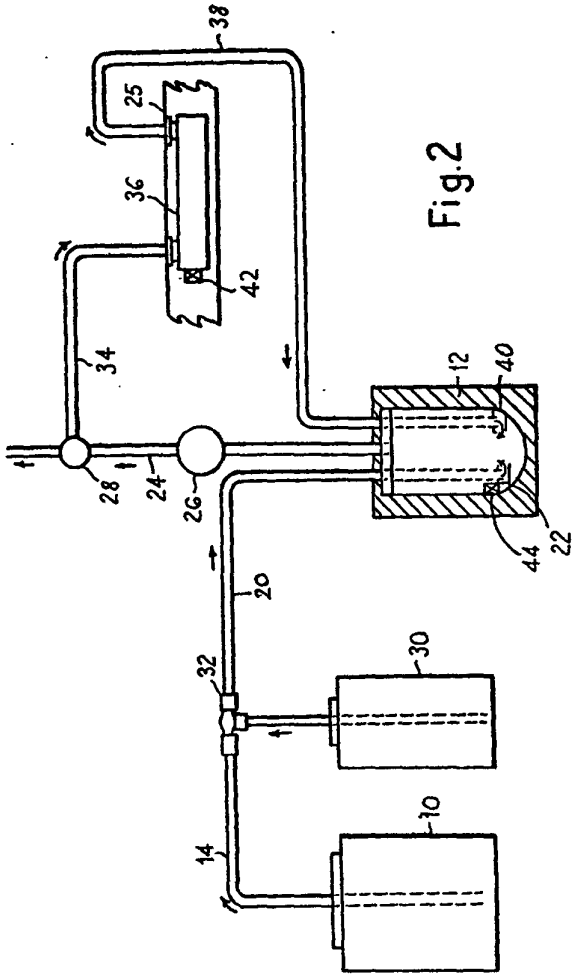

Fig.2

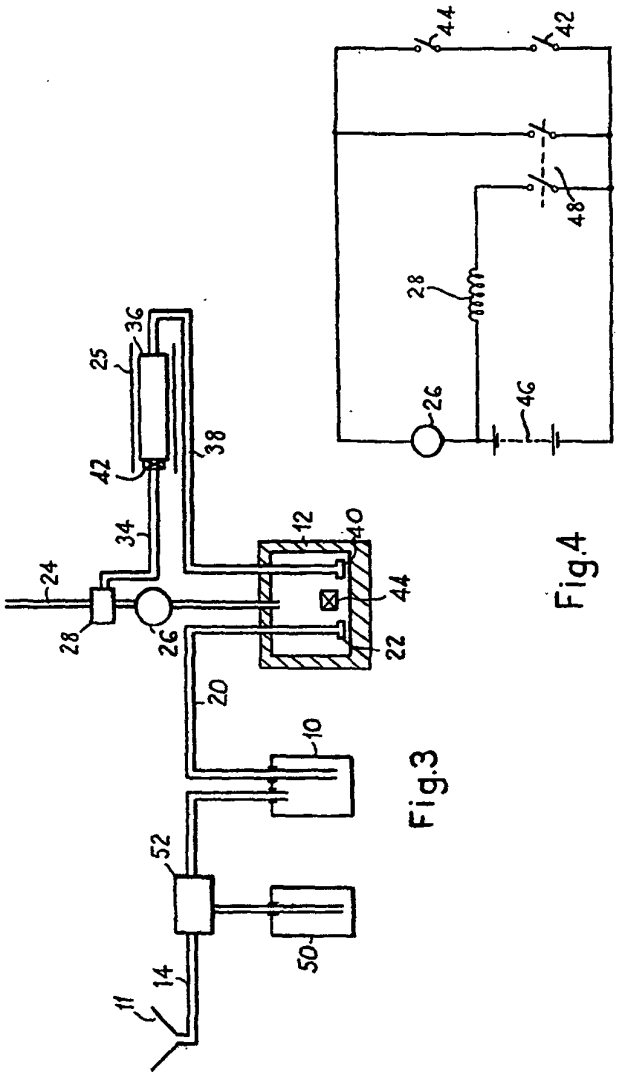

Fig.4

Fig.3

Fig.5

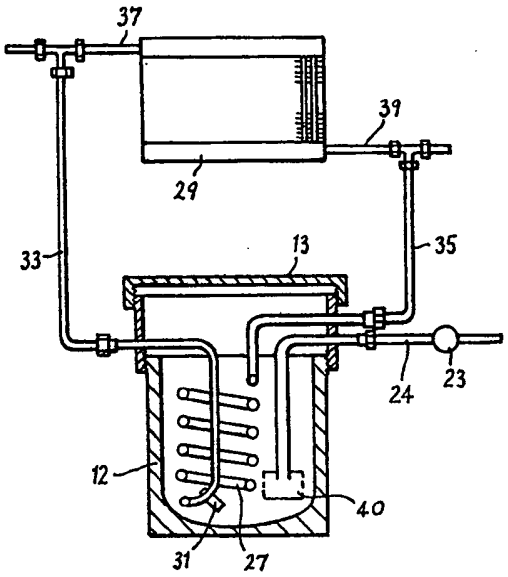

Fig.6

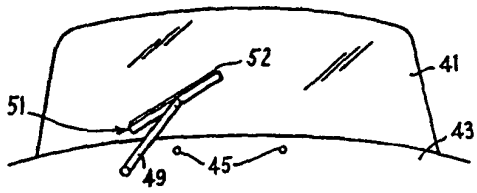

Fig.7

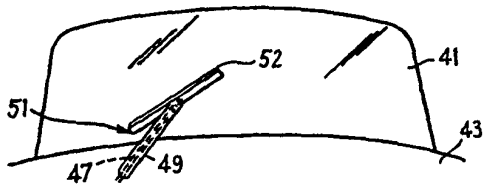

Fig.8